

REMARKS

Claims 1-16 are currently pending in the application. Claims 1, 13 and 16 are the pending independent claims.

In the outstanding Office Action, the Examiner rejected claims 1-6, 8 and 13-16 under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent 6,091,110 issued to Hebert et al. (hereinafter “Hebert”) in view of Wilson et al., “Handbook of Multilevel Metallization for Integrated Circuits,” (hereinafter “Wilson”) and U.S. Patent 6,162,665 issued to Zommer (hereinafter “Zommer”). The Examiner further rejected claims 7 and 9-12 under 35 U.S.C. §103(a) as allegedly unpatentable over Hebert in view of Wilson and Zommer and further in view of U.S. Patent 5,847,283 issued to Finot et al. (hereinafter “Finot”).

With regard to the §103(a) rejection of claims 1-6, 8 and 13-16, Applicants respectfully submit that Hebert, Wilson and Zommer, even if combinable, collectively do not teach each and every limitation of these claims.

Independent claims 1, 13 and 16 each recite a stress compensation layer with a tensile stress sufficient to counterbalance at least a portion of an overall residual stress of a power transistor device. The overall residual stress is attributable, at least in part, to a thinning of a substrate of the device. Hebert in view of Wilson and Zommer do not teach or suggest any of these limitations.

First, the combined references fail to teach or suggest a device having an overall residual stress that is attributable, at least in part, to a thinning of a substrate of the device. The Examiner asserted that the processing techniques disclosed in Zommer will “introduce damage that will alter the residual stress.” See Office Action, page 3, 1st paragraph. Applicants respectfully submit that Zommer makes no mention of stress levels, how stress levels are affected by substrate processing or “introducing damage” to the substrate resulting in a residual stress. Therefore, one of ordinary skill in the art would not obtain any of these above-noted limitations from the disclosure of Zommer, without using the present application as a guide. Further, it is not apparent to Applicants how “introducing damage” to the substrate would affect stress levels, if at all. The teachings of Zommer, which are related to voltage characteristics, appear to have

been taken out of the context in which they were presented. As such, Applicants respectfully resubmit that the proposed combination of references simply does not teach having an overall residual stress attributable, at least in part, to substrate thinning.

Second, the combined references fail to teach or suggest a stress compensation layer with a tensile stress sufficient to counterbalance at least a portion of an overall residual stress of a power transistor device. The Examiner asserted that Wilson, in combination with Hebert, teaches that an oxide film “formed on a substrate as . . . [a] stress compensation layer . . . exhibits a tensile stress, where the thickness [of the film] can be adjusted to achieve a counterbalancing of the overall residual stress.” See Office Action, page 2, 3rd paragraph. Applicants respectfully disagree with the Examiner’s assertions.

Whether or not the proposed Wilson/Hebert combination discloses an oxide layer which may have some level of mechanical stress associated therewith, as proposed by the Examiner, the combined teachings in no way relate the tensile stress of that layer to any overall residual stresses of a device. As such, the references do not teach a layer having a tensile stress sufficient to counteract a portion of a residual stress of the device.

Applicants further submit that one of ordinary skill in the art would not find any motivation to combine the references, or to modify the reference teachings, as the Examiner suggests. The Federal Circuit has stated that when patentability turns on the question of obviousness, the obviousness determination “must be based on objective evidence of record” and that “this precedent has been reinforced in myriad decisions, and cannot be dispensed with.” In re Sang-Su Lee, 277 F.3d 1338, 1343 (Fed. Cir. 2002). The Federal Circuit has further stated that “conclusory statements” by an examiner fail to adequately address the factual question of motivation, which is material to patentability and cannot be resolved “on subjective belief and unknown authority.” Id. at 1343-1344.

Applicants submit that the Examiner has failed to provide any objective evidence of motivation to combine Hebert, Wilson and Zommer, or to modify the teachings of Hebert, Wilson and Zommer to meet the particular limitations of claims 1-6, 8 and 13-16. Instead, the Examiner provides, for example, the following statement of obviousness:

[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to combine Wilson et al. with Hebert to obtain a tensile film that could be altered to counterbalance residual stress within the device. (Office Action, page 2, 3rd paragraph)

This is a conclusory statement of obviousness based on the type of “subjective belief and unknown authority” that the Federal Circuit has indicated as being insufficient to support an obviousness rejection. The Examiner has simply recited an advantage of the present invention as subjective grounds for combining the references. There is no identification of objective evidence of record which supports the proposed combination.

In fact, Applicants submit that Wilson teaches away from using a film to counteract stress. For example, in Wilson it is stated that “[s]tress is a major failure mechanism of deposited thin films since high stresses cause film cracking and delamination,” (emphasis added). Wilson, page 223, 2nd paragraph. Thus, Applicants respectfully submit that one of ordinary skill in the art, given the overall teachings of Wilson, would not choose to employ a thin film to counteract stress, but would instead make attempts to minimize or eliminate the stress effects associated with these films (as is clearly prescribed in the teachings of Wilson).

Regarding the rejection of claims 7 and 9-12, Applicants respectfully submit that these claims are allowable at least by virtue of their dependence from claim 1, for the reasons identified above. Moreover, these claims define additional separately patentable subject matter for the reasons identified below.

For example, with regard to claim 7, this claim calls for the steps of thinning the substrate and applying a stress compensation layer to be performed repeatedly until a desired curvature is attained. The proposed combination of Hebert, Wilson, Zommer and Finot does not teach or suggest this limitation of the claimed invention. The Examiner alleges that, for example, Wilson and Finot teach measuring and monitoring curvature. See, for example, Office Action, page 4, 3rd paragraph. The Examiner, however, fails to reference any teachings, express or implied, in the proposed combination of references directed to repeatedly thinning the substrate and applying a stress compensation layer until a desired curvature is attained. Such a teaching does not exist in the combined references.

With regard to claim 9, this claim calls for the stress compensation layer to be applied to change the curvature of the device. The proposed combination of Hebert, Wilson, Zommer and Finot does not teach or suggest applying a stress compensation layer to change the curvature of a device. Such a teaching is not present in the references.

With regard to claim 10, this claim calls for the stress compensation layer to be applied to the surface of the device to maintain the curvature of the device. The proposed combination of Hebert, Wilson, Zommer and Finot does not teach or suggest this limitation of the claimed invention. The Examiner asserted that Wilson teaches that "appropriate curvature before and after film deposition can be monitored to alter or maintain the curvature." See Office Action, page 4, 3rd paragraph. The section of Wilson cited by the Examiner, however, is merely directed to thin film stresses and "measuring the change in wafer curvature before and after the film deposition." Wilson, page 223, 2nd paragraph. No mention is made of maintaining curvature. As such, the combined references fail to teach this above-noted limitation of the present invention.

In view of the foregoing, the invention, as claimed in claims 1-16, cannot be said to be taught or suggested by the collective teachings of Hebert, Wilson, Zommer or Finot. Accordingly, Applicants submit that all of the pending claims are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

Respectfully submitted,



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